SBS Design Status

Robin Wines

SBS Design

- Transfer in process of yoke steel from BNL , but BNL is having issues with their magnet tagging system – update from BNL on April 23rd
- Radiation survey has cleared material for transport
- Shipping arrangements are in process at JLAB
- Storage location has been allocated at JLAB
- Rigging company will be contracted when shipping date is known

- BNL continues to look for steel plates for us to use as counterweight – need radiation clearance

- Power Supply specification has been reviewed. Giles is getting budgetary estimate to determine if we proceed with bidding or sole source procurement

- Experiment configurations complete. Magnet steel cutouts defined by magnet simulation.

- Integral field strength specified as 2.0T-m and 2.5T-m with pole shims. Analysis at I=2000A results in 1.4 to 1.6 T-m . OK ?

- Continue to optimize design of field clamps and beam line. Previous analysis models indicate shielded beam line achievable with use of solenoid coils at magnet entrance and exit.

- Continue design of support and counterweight

SBS Kinematics

G_E^n

Q^2 [GeV^2]	E_{beam} [GeV]	θ_{bb} [deg]	θ_{48D48} [deg]
1.46	2.2	40.0	39.4
3.68	4.4	34.0	29.9
6.77	6.6	34.0	22.2
10.18	8.8	34.0	17.5

- Distance to BigBite is 1.5 m
- Distance to 48D48 is 2.8 m
- Distance to HCAL is 17m

G_M^n

Q^2 [GeV^2]	θ_{bb} [deg]	θ_{48D48} [deg]	d_{48D48} [m]	d_{HCAL} [m]
3.5	32.5	31.1	2.0	7.2
4.5	41.9	24.7	1.8	7.0
6.0	64.3	15.6	1.6	6.8
8.5	46.5	16.2	1.8	11.
10.0	33.3	17.9	2.25	13.
12.0	44.2	13.3	2.1	14.
13.5	33.0	14.9	3.1	17.

Distance to BigBite is 1.5m except Q^2 = 10.0 distance to BB = 2.1 m

G_E^p

Experimental Points

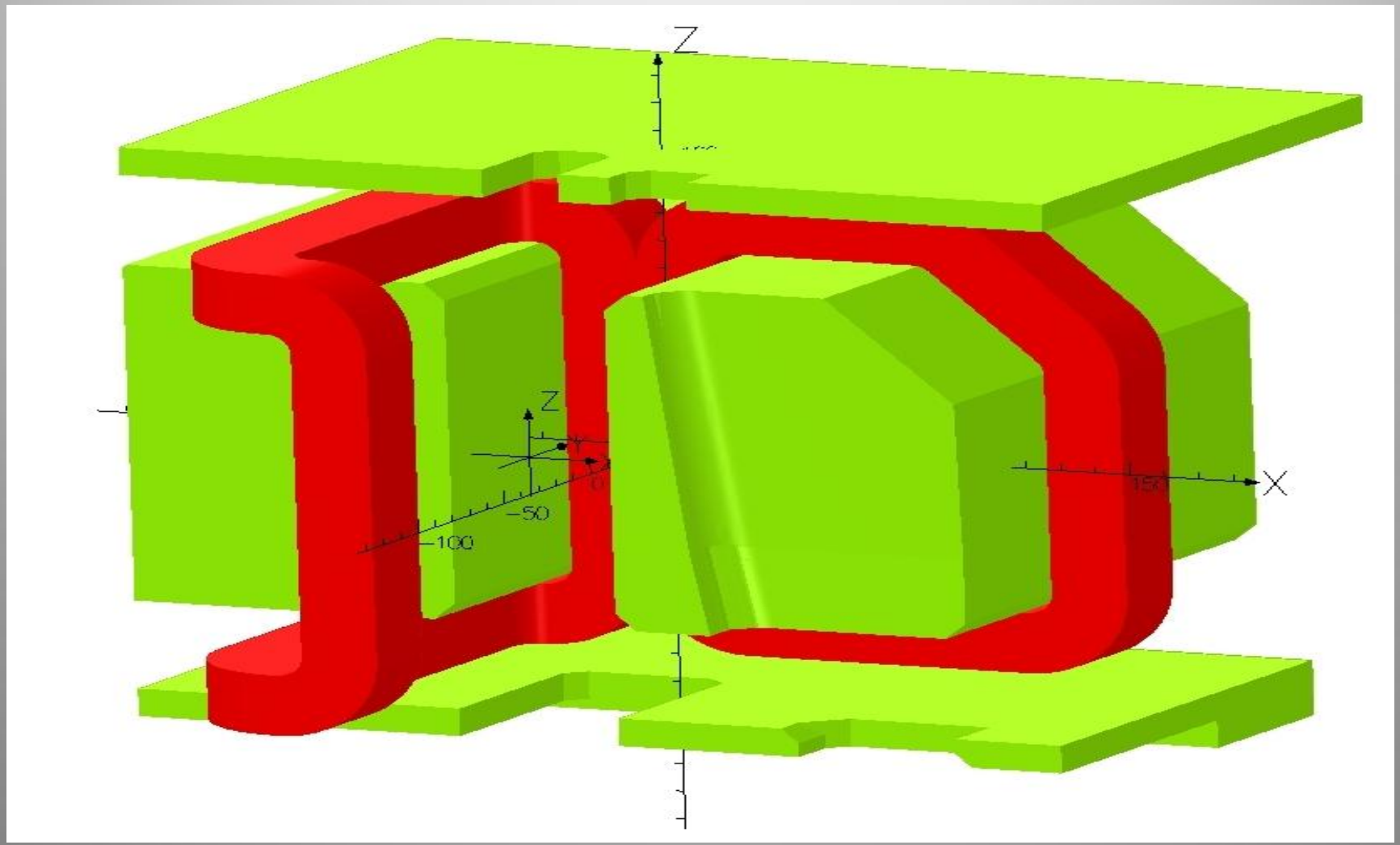
Q^2 [GeV^2]	$\theta_{electronarm}$ [deg]	θ_{48d48} [deg]	d_{48d48} [in]	$d_{electronarm}$ [m]
5.0	26.1	28.2	63	4.2
8.0	26.7	22.1	63	3.7
12.0	29.0	16.9	63	3

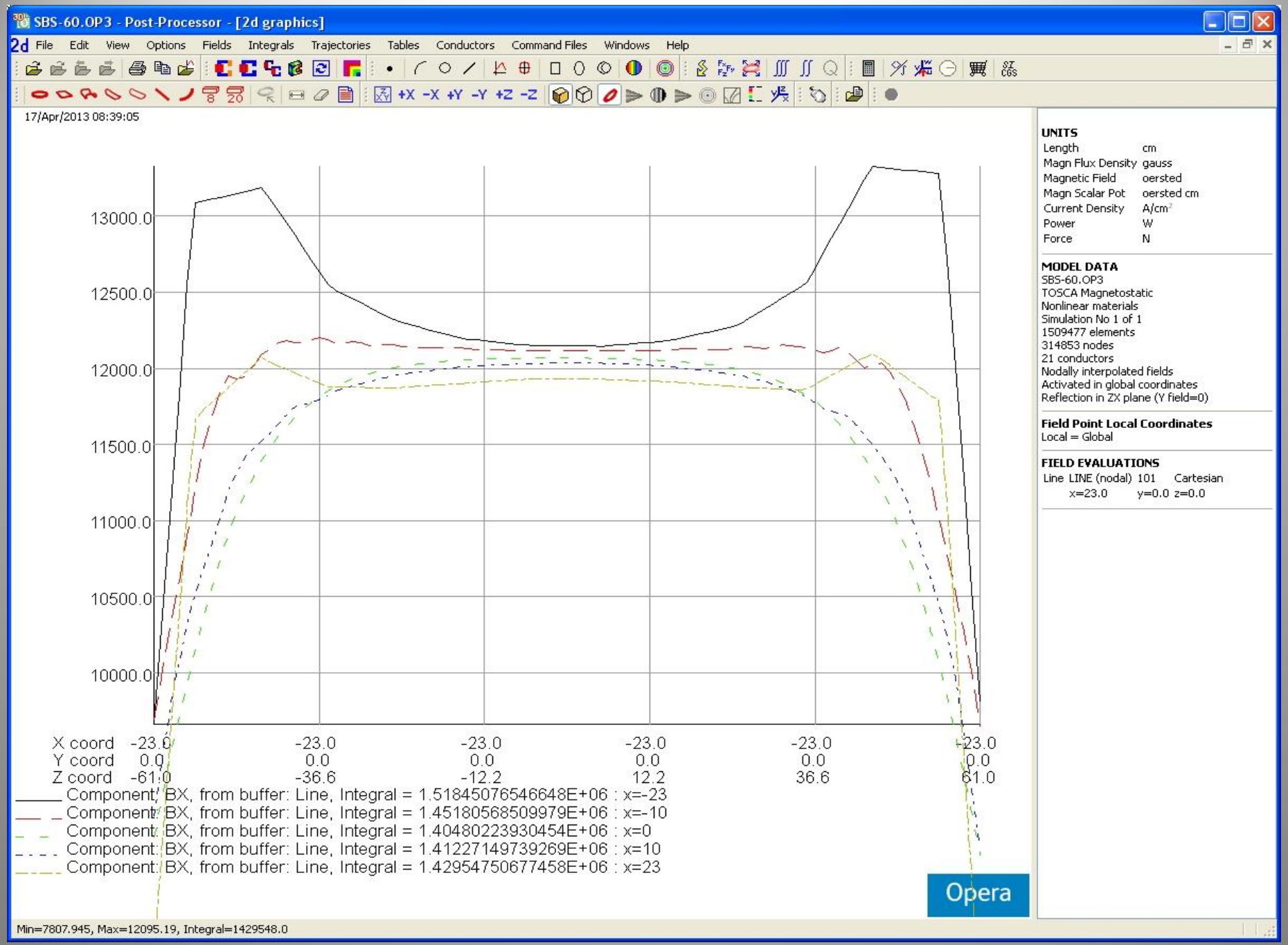
Calibration Points:

Q^2 [GeV^2]	θ_{HRS} [deg]	θ_{48D48} [deg]	d_{48D48} [m]	d_{HCAL} [m]
3.5	34.1	31.1	3.0	17.
3.5	30.9	31.1	3.0	17.
6.0	69.1	15.6	3.0	17.
6.0	65.9	15.6	3.0	17.
6.0	62.7	15.6	3.0	17.
6.0	59.5	15.6	3.0	17.

- Distance to BigBite is 1.55 m

Magnet Cutout and Field Clamps

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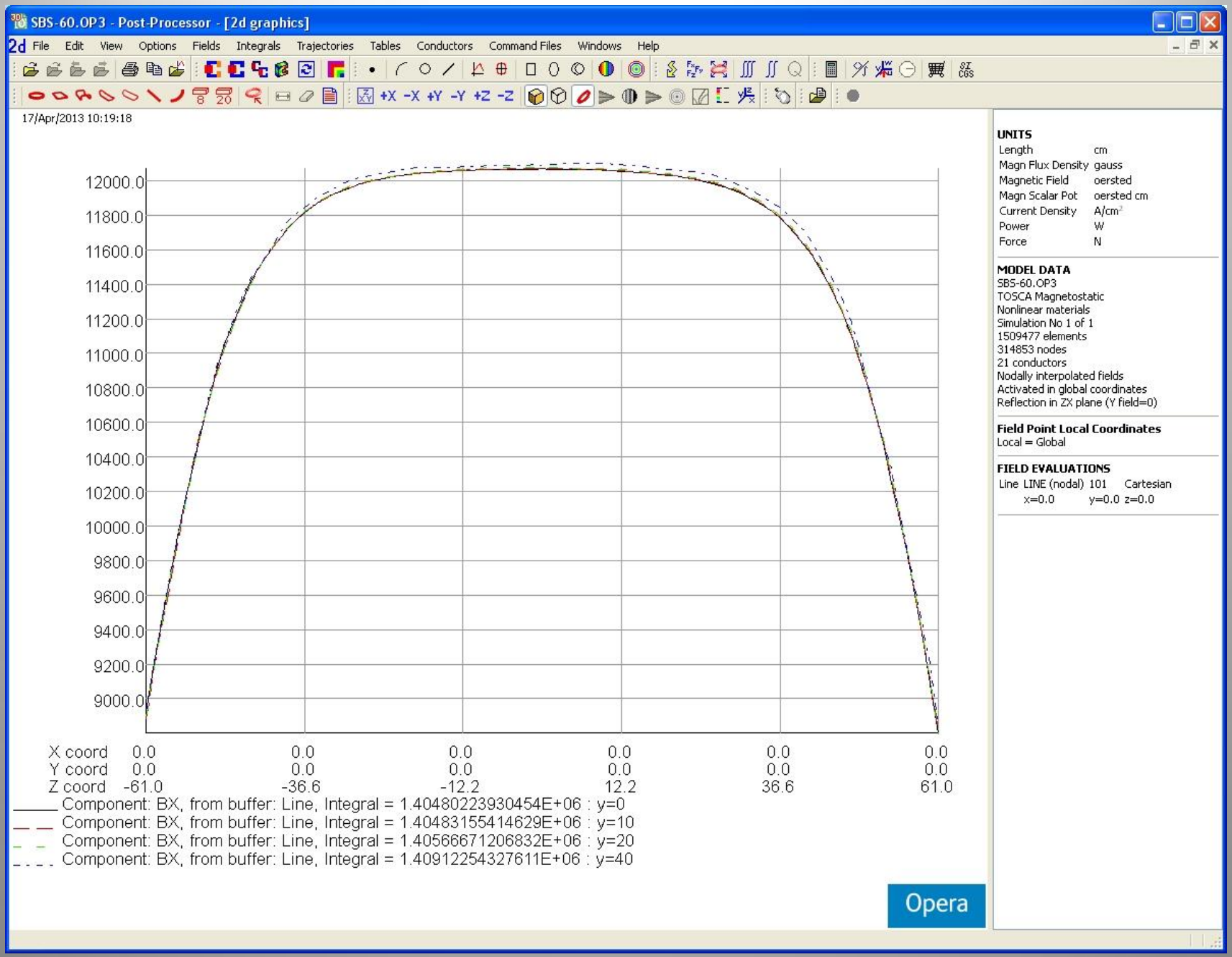
2d File Edit View Options Fields Integrals Trajectories Tables Conductors Command Files Windows Help
17/Apr/2013 08:39:05
13000.0
12500.0
12000.0
11500.0
11000.0
10500.0
10000.0
X coord -23.0 -23.0 -23.0 -23.0 -23.0 -23.0
Y coord 0.0 0.0 0.0 0.0 0.0 0.0
Z coord -61.0 -36.6 -12.2 12.2 36.6 61.0
Component BX, from buffer: Line, Integral = 1.51845076546648E+06 : x=-23
Component BX, from buffer: Line, Integral = 1.45180568509979E+06 : x=-10
Component BX, from buffer: Line, Integral = 1.40480223930454E+06 : x=0
Component BX, from buffer: Line, Integral = 1.41227149739269E+06 : x=10
Component BX, from buffer: Line, Integral = 1.42954750677458E+06 : x=23
UNITS
Length cm
Magn Flux Density gauss
Magnetic Field oersted
Magn Scalar Pot oersted cm
Current Density A/cm²
Power W
Force N
MODEL DATA
SBS-60.OP3
TOSCA Magnetostatic
Nonlinear materials
Simulation No 1 of 1
1509477 elements
314853 nodes
21 conductors
Nodally interpolated fields
Activated in global coordinates
Reflection in ZX plane (Y field=0)
Field Point Local Coordinates
Local = Global
FIELD EVALUATIONS
Line LINE (nodal) 101 Cartesian
x=23.0 y=0.0 z=0.0
Opera
Min=7807.945, Max=12095.19, Integral=1429548.0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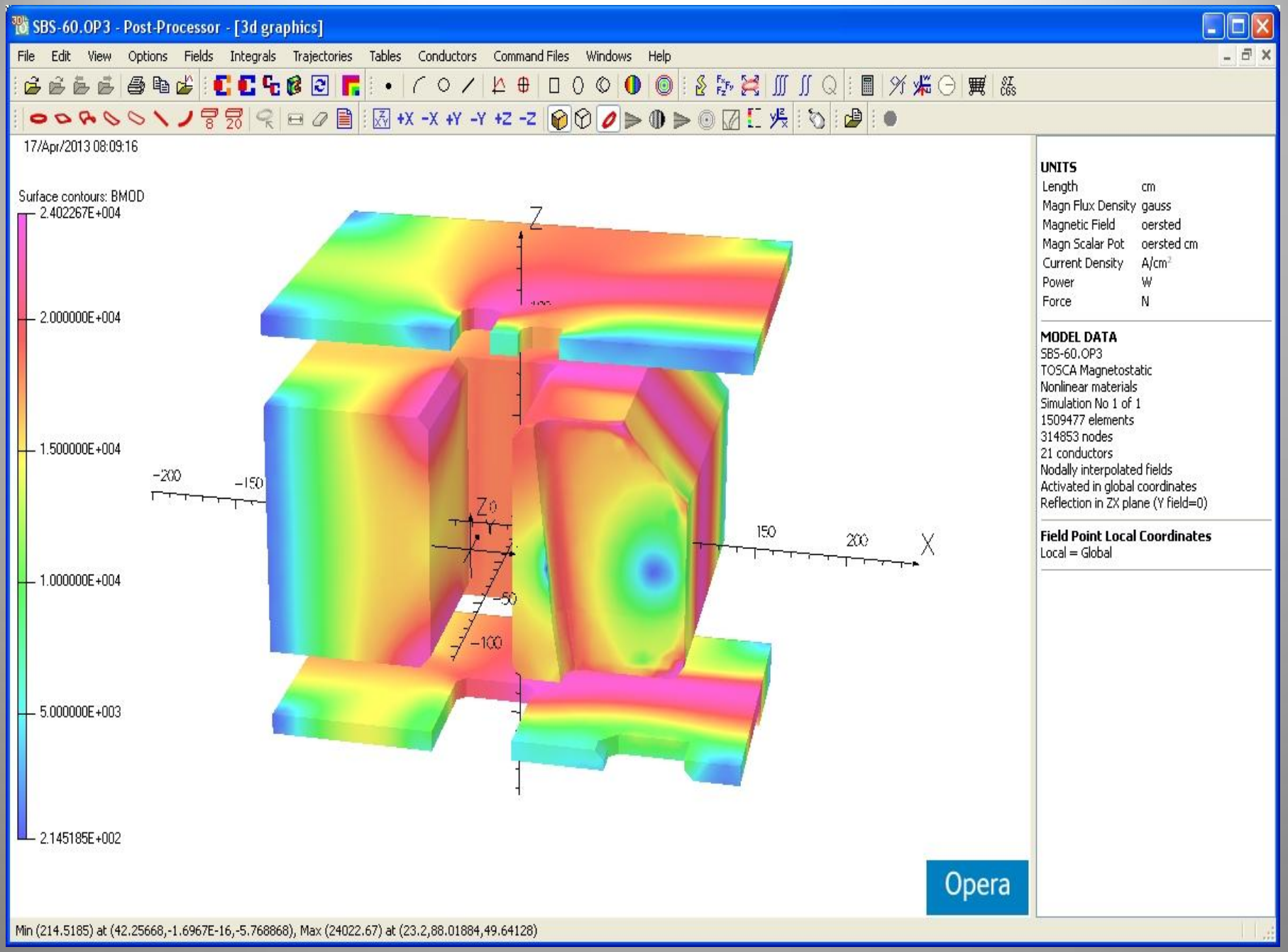
12000.0
11800.0
11600.0
11400.0
11200.0
11000.0
10800.0
10600.0
10400.0
10200.0
10000.0
9800.0
9600.0
9400.0
9200.0
9000.0
X coord 0.0 0.0 0.0 0.0 0.0 0.0
Y coord 0.0 0.0 0.0 0.0 0.0 0.0
Z coord -61.0 -36.6 -12.2 12.2 36.6 61.0
Component: BX, from buffer: Line, Integral = 1.40480223930454E+06 : y=0
Component: BX, from buffer: Line, Integral = 1.40483155414629E+06 : y=10
Component: BX, from buffer: Line, Integral = 1.40566671206832E+06 : y=20
Component: BX, from buffer: Line, Integral = 1.40912254327611E+06 : y=40
Opera
UNITS
Length cm
Magn Flux Density gauss
Magnetic Field oersted
Magn Scalar Pot oersted cm
Current Density A/cm²
Power W
Force N
MODEL DATA
SBS-60.OP3
TOSCA Magnetostatic
Nonlinear materials
Simulation No 1 of 1
1509477 elements
314853 nodes
21 conductors
Nodally interpolated fields
Activated in global coordinates
Reflection in ZX plane (Y field=0)
Field Point Local Coordinates
Local = Global
FIELD EVALUATIONS
Line LINE (nodal) 101 Cartesian
x=0.0 y=0.0 z=0.0


SBS-60.OP3 - Post-Processor - [3d graphics]
File Edit View Options Fields Integrals Trajectories Tables Conductors Command Files Windows Help
17/Apr/2013 08:09:16
Surface contours: BMOD
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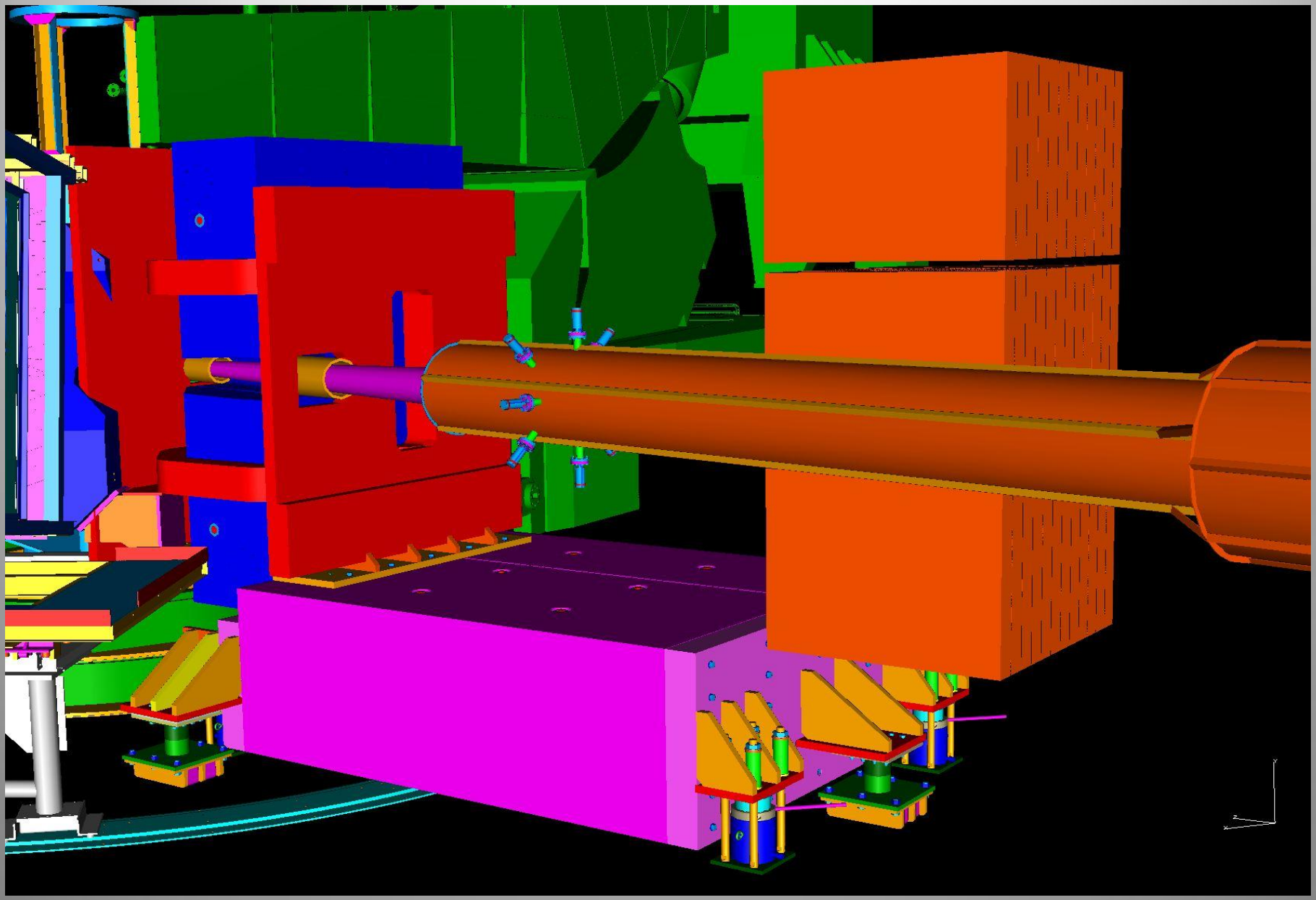
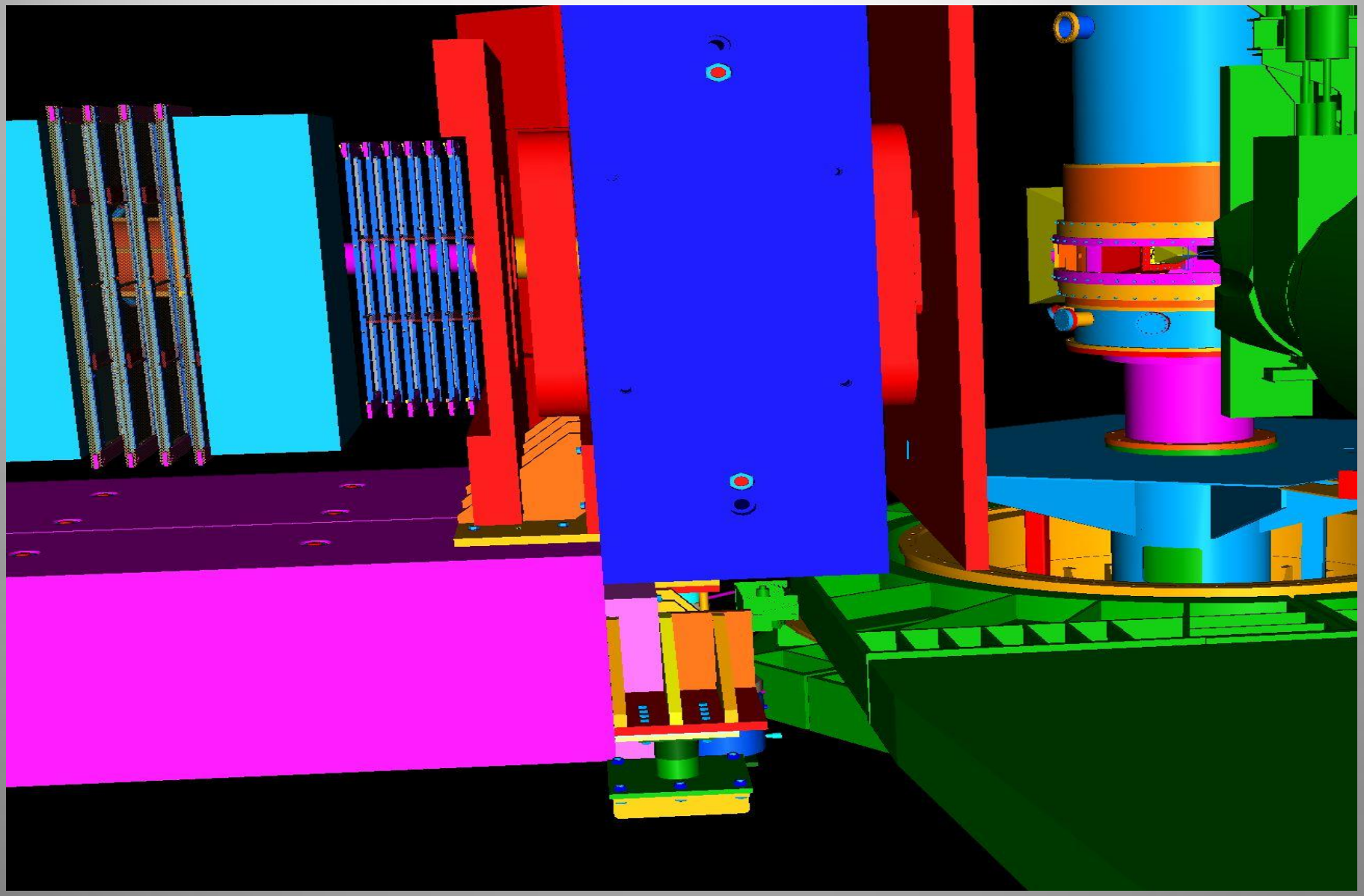
2.000000E+004
1.500000E+004
1.000000E+004
5.000000E+003
2.145185E+002
Z
X
-200
-150
150
200
-50
-100
UNITS
Length cm
Magn Flux Density gauss
Magnetic Field oersted
Magn Scalar Pot oersted cm
Current Density A/cm²
Power W
Force N
MODEL DATA
SBS-60.OP3
TOSCA Magnetostatic
Nonlinear materials
Simulation No 1 of 1
1509477 elements
314853 nodes
21 conductors
Nodally interpolated fields
Activated in global coordinates
Reflection in ZX plane (Y field=0)
Field Point Local Coordinates
Local = Global
Opera
Min (214.5185) at (42.25668,-1.6967E-16,-5.768868), Max (24022.67) at (23.2,88.01884,49.64128)

GMn Q^2 =12.0



GEp Q^2 = 5.0



Key: blue=design, orange=engineering

SBS Design/Engineering	design	eng	Calendar time to procure	procure	Milestone Complete	Status
	mw	mw	w	$		
	31	22	196	764251		
Magnet support and motion	8	4	24	102200	28-Apr-14	60%
Analysis of magnet mods		4			17-Dec-12	90%
Magnet assembly plan	4	2			19-Jan-15	
Magnet yoke modifications	2	2	24	36792	30-Sep-13	30%
New coils	3	1	40	153300	2-Jan-14	20%
Magnet assembly	2					
Magnet hardware-buss, coil support, cooling lines	1	1				
Power supply		2		137970	31-Jul-13	30%
Field Clamps		1	24	26572	26-Aug-13	10%
upstream	0.5					
downstream	0.5					
BigBite	0.5					
Shielded beampipe &vacuum snout	2	1	32	15330	1-Apr-14	20%
Solenoid coils	0.5	1	24	2453	2-Jan-14	10%
Beamline and field clamp supports	3	1			1-Apr-14	
SBS detector supports	3	1	28	51100	31-Jul-13	10%
Magnet pole inserts	1	1				
all other				238534